

# PET User Notes

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Plot Routine  
JS Barney Bryn Mawr, PA

Here's a simple plot routine to achieve maximum resolution from your graphics. It will be evident from an examination of your keyboard that two choices are available: maximum X resolution or maximum Y resolution.

Here's Y:

```
10 D$="dddddddddddddddddd":REM 23 CURSOR DOWN
20 X$="":REM 39 CURSOR RIGHT
30 Y$="":REM 23 CURSOR UP
40 V$="":REM 8 HORIZONTAL BARS
45 REM BARS ARE ON CHARACTERS $R$C$D$E$ ENTERED SEQUENTIALLY
50 PRINT "c";V$;
100 FOR X=1 TO 28
110 Y=(14-X)^2
130 GOSUB 700
135 NEXT X
150 GET Z$:IF Z$=""GOTO150
160 END
700 XZ=X:YZ=Y:B:VZ=(Y-B*YZ)+1
800 IF XZ=0 GOTO 1000
900 PRINTLEFT$(X$,XZ);
1000 IF YZ=0 GOTO 1200
1100 PRINTLEFT$(Y$,YZ);
1200 PRINTMID$(V$,VZ,1);
1300 PRINT "h";B;
1400 RETURN
```

READY.  
c=clear,h=home,r=cursor right,d=down,u=up

Lines 10 through 50 establish strings in memory and initialize the screen.

Lines 700 through 1400 plot the point (X,Y) and return to main program.

Thus, the main program would contain lines 10 through 50 and subsequently a GOSUB 700 would be used to plot.

Please note that translation and scaling of the variables X,Y must assure that  $0 \leq X\% \leq 40$  and  $0 \leq Y\% \leq 23$ .

If you are unsure of the scaling and translation, then enter conditional statements to exit and/or flag to prevent scrolling the plot.

\*\*\*\*\*

```
1 REM ROT BUSDIECKER
2 REM TO FIND THE REMAINDER (R) IN INTEGER DIVISION
3 REM (Q IS THE QUOTIENT);
4 REM
10 INPUT "DIVISOR";M
20 INPUT "DIVIDEND";N
25 IF N=0 GOTO 10
30 Q=INT(N/M)
40 R=N-M*INT(N/M)
50 PRINT "QUOTIENT";Q;"REMAINDER";R
60 GOTO 10
```

## GENERAL

Commodore raised the price of their printer from \$595 to \$695. Although the increase is significant, the price/performance is still very attractive (I ordered my printer before the increase, I hope). Deliveries are scheduled for October.

At the Chicago Consumer Electronics Show, Commodore exhibited a dual drive increased density minifloppy system (260,000 bytes?). The anticipated price is \$1000, with delivery in early 1979.

None of the Commodore announced software has been shipped yet. Neither has Commodore sent documentation or User Manuals. Other than the 019 ROM replacement to fix the cursor loss, none of the significant system and BASIC bugs have been corrected. Several people have also written they had trouble even acquiring the cursor fix ROM.

Commodore also announced a PET schematic-diagnostic package for sale at \$30. Included will be: edge connectors (for running diagnostics); diagnostic routine cassette; diagnostic package manual; and schematics of the circuit boards. Delivery is 4 weeks (no comments like "from when?" allowed).

Commodore plans to have ROM fixes for many of the BASIC and operating system bugs in about 10 weeks, along with Machine Language Monitor in ROM.

## ANNOUNCEMENTS

CORS Microtech, Box 368, Southampton, PA 18966, (215) 757-0284 announced PETEX, a PET to S-100 single board adapter card which will plug into a slot on an S-100 system. The board generates all S-100 bus signals, and comes assembled and tested for \$195. CORS also announced disk software for 6502 systems to support the Versafloppy disk controller. Supplied on a 2708 EPROM and diskette at price of \$40.

HL Sandy, Box 1535, Corinth, MS 38834 has coding-documentation pads of about 50 sheets for PET at \$2 or 5 for \$7.50 postpaid. Each page has all PET character representations as well as a 40x25 screen layout on the back.

Creative Computing (Creative Computing Software, Box 769-M, Morristown, NJ 07960) is looking for PET software to market on a royalty basis -- generally 10-15% of a retail price of \$7.95. Send software on cassette along with any necessary documentation and return postage.

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Connecticut microComputer, 150 Pocono Road, Brookfield, CT 06804 has a word processing program for PET for \$29.95. The software supports shift reversal, upper and lower case, tape storage, output to printer, and all the necessary word processing/editing commands. (The CMC Word Processor is being used for this section and seems to work quite well.)

Microsignal, Box 161988, Sacramento, CA 95816 has announced COMPUVOX, a low cost (\$29.95) voice recognition unit for PET. Compuvox apparently recognizes number and duration of sounds (not the actual word). Two programs (Voicetrap and Voicemaze) are available for \$3.95 each to demonstrate Compuvox. Sounds like fun.

Microtronics, 5943 Pioneer Road, Hughson, CA 95326, (209) 634-8888 announced the M-65 Ham Interface for PET. The package includes the hardware, and programs MORSE and RITY on cassette for \$99.95. The system was designed by Ron Lodewyck (M&EE) one of the co-authors of Commodore's Basic BASIC (forthcoming?).

On a related subject, Larry Williams (N5CX), San Antonio, mentioned a group of ham PET owners meet each Sunday morning at 15:00 UCT (10:00AM CDT) on 14240 KHz.

Stefan Ran, Wedellstr. 23, 1000 Berlin 46, GERMANY has some programs on cassette to sell (\$10 for entire cassette incl. air mail) or trade for equivalent tapes. His tape includes a basic file system with up to 10 record elements; a descriptive program; and several miscellaneous items including a music program and several math plotting routines.

I received a series of five workbooks from Total Information Services, Box 921, Los Alamos, NM 87544. They are entitled: Getting Started with Your PET; Pet String and Array Handling; PET Graphics; PET Cessette; and PET Miscellaneous. The books appeared to be nicely done. While they start out at a beginning level, the author still assumes you have had some exposure to BASIC (such as one of the many available BASIC textbooks).

Program Design, Inc., 11 Ider Court, Greenwich, CT 06830 has several educational programs for PET, including vocabulary builder and number practice.

Russell Brockett, 401 Monument Rd, #177, Jacksonville, FL 32211 is part of a group offering low cost PET software (\$2.50 for first program and tape, \$1.50 each additional program). Write for list of programs.

Edward Lichten, 10301 Falling Tree Way, Louisville, KY 40223 has programs for exchange (STATECAPS, MATH by grade level, Biorythm, letter recognition for preschoolers).

Rick Goldsmith, 2730 Townway Rd. No. E54, Denville, IL 61832 is interested in the possibility of a user group in central Illinois. Contact him if you are in that area.

As we were ready to take this issue to the printer, I received a copy of PET FORTH (a version of their 6502 FORTH) from Programma Consultants, 3400 Wilshire Blvd, Los Angeles, CA 90010. Programma stated they would have a Primer and full User Reference available in the near future. Hope to have more on this in the next issue.

#### MISCELLANEOUS

Several people (Grant Paul, Charley Musselman among others) wrote that the random number can be almost randomly seeded after PET has been cold-started by using the negative value of the jiffy check: `X=RND(-TI)`

Users in the California Bay area reported seeing a demonstration of a very nice PET assembler, link editor, and text editor all written in machine language. The package will be available in the near future.

A number of people also suggested clear nail polish as a means of protecting keytops. A slightly more elegant sounding suggestion from Fred Mellender was Grumbacher Hyplar Gloses Medium from art supply stores. Frank Covitz suggested Dennison's Pres-A-Ply Clear Seal plastic sheet.

I have signed up for one of the user group meeting rooms at PC 78. The registration was late, however, so I don't know if we'll get the room. If not, I'll be at the ACG-NJ 6502 group meeting area.

Have received good comments from people about the following units:

BETS1, Forethought Products, Box 8066, Coburg, OR  
EXPANDAPET, Convenience Living Systems, 648 Sheraton Dr., Sunnyvale, CA 94087  
PEN-8K, International Technical Systems, Box 264, Woodbridge, VA 22194

Saw some of the CMS Casino series programs (Blackjack, Baccarat, etc.), and thought they were very nicely done -- good graphics and good descriptions of both the actual games and program operation.

We have about 4 pages of memory map and memory locations. Since I did not feel everyone is interested in these, I didn't include them in this issue. If you want a copy, please send stamped self addressed envelope and 2 extra stamps (unattached) for copy costs.

Received "24 Second Cubic" program from Mike Louder. Although it plays much faster than the Kilobaud original, the primary intent was to demonstrate program run time enhancement by dynamically modifying BASIC code. Mike will hopefully have an article on this by next issue.

I recently purchased a printer with RS-232 interface since Commodore is not yet shipping theirs (printer). To get up and running quickly, I obtained an IEEE to RS-232 adapter from Connecticut microComputer. The interface worked without a hitch, and most of the listings you see in this issue were done on the printer and adapter.

Arthur Hudson, Ottawa, Ontario suggested we run a contest to find the program which does the most in 4 lines. His entry:

```
10 PRINT"clr screen":FORI=1TO999
20 PRINTCHR$(INT(2*RND(2))+205);:NEXT
30 POKE33307,83
40 FORJ=1TO12000:NEXTJ:GOTO10
```

The program draws a maze and allows about 16 seconds to get out.

Mr. Hudson also suggested a printer as the prize, and further inferred that I should send him the printer right away since no one would best his entry. While I think the contest is OK, I would like to revise the prize structure: an autographed listing of Mr. Hudson's program to anyone surpassing the above entry. For Arthur Hudson a certificate of merit printed on the back of used Mod 33 teletype paper. A clever program anyway -- thanks Arthur.

Thanks also to Neil Bussey of SPHMX for sending the programs Resequene (by Joe Trimble) and Unlist (by Lerry Tessler) which are listed in this issue, and for MINONDIS (monitor-dissassembler).

#### Errors in V 1, Issue 4

Andrew Fraley, 1753 York Road, Reading, PA 19610 is selling Bomber, Indy, Seawolf, and Dogfight for \$5.95 (for all four, not each).  
Page 2 -- "Sensing Keys". Shift depression checked in location 516.  
Page 3 Cosine abbreviation should be COs (who would do it, though).  
Page 6 & 7 -- "LIFE" 190F should contain 60, and 1A68 should have B0 CF.

## Programs on Tape

SEQUENCE -- you have to sort a character list  
STATECAPS -- quiz on states and capitals from Kilobaud 3/78  
RACETRACK -- see listing in V.1, Issue 3 -- RE McGee  
DEFLECTION -- F Dunlap  
ADDITION -- math drill -- F Dunlap, C Pitcaim  
OTHELLO -- from Byte 9/77  
OTHELLO for 2 -- F Dunlap  
BAGELS -- Like Mastermind -- J Butterfield  
Cash flow/ Return on Investment -- R Goldsmith  
STAR TREK  
BLACKJACK -- D Liem - nice graphics, humorous patter by dealer  
LIFE -- 40\*25 F Covitz  
LIFE -- 64\*64 F Covitz  
TRAP -- trap the PET, avoid being trapped  
SUPER MASTERMIND -- JR Marcou  
LUNAR LANDER -- JR Marcou  
NIM -- J Butterfield  
QUBIC -- 3D Tic-Tac-Toe  
LIST MEMORY -- Charles Combs  
Machine Language Monitor -- a good version - similar to the one  
Commodore will be sending  
TIME -- large clock display  
BIORYTHM -- Kenneth Finn - very concise code - plots with only  
30 BASIC statements  
KING -- business-social simulation or game  
BREAKOUT -- simple version of the arcade game  
SWATPLOT -- F Campbell (see V.1 Issue 3) - plots in 80x50 format  
Word Processor -- MRichter, RJulin - no printer interface yet  
MAXIT -- Harry Saol - clever game and nicely programmed  
WUMPUS  
MARKET -- corporate simulation  
CONCENTRATION -- Francis Chambers - displays 52 cards  
ESP TEST -- Francis Chambers  
DO-ALL -- JK Johnson from Kilobaud  
SHARK BAIT -- JK Johnson - hangman style program  
FLEA RACE -- JK Johnson  
AWARI -- Hans-J Koch - German instructions  
CHASE with Sound  
STAR LANES -- Gerald Hasty - Interface Age  
KALEIDOSCOPE -- Jerry Panofsky - People's Computers  
HEXDEC -- Wayne Reindollar -- converts and pokes values into  
memory for machine language programs  
24 Second QUBIC -- Mike Louder  
DOODLER -- Jim Brannan - draw type program  
GNIP GNOP -- Jim Brannan - 2 player ping pong  
PONG -- People's Computers  
CURFIT -- J Butterfield - fits data to 6 curves  
TRIANGLE -- J Butterfield - solves any triangle  
METRIC -- J Butterfield - does metric conversions  
DATES -- J Butterfield - day of week, days between  
TRENDLINE -- J Butterfield - fits, forecasts, graphs  
MILEAGE -- J Butterfield - distances from Latitude/Longitude  
FACTORS -- J Butterfield - prime factors of any number  
MORTGAGE -- J Butterfield - schedule of payments  
FINANCE -- J Butterfield - present, future value etc.  
BATTLESHIPS -- J Butterfield - you vs. computer  
MOONLANDER -- J Butterfield - graphics  
BREAKOUT -- J Butterfield - paddle ball  
CRYPTO -- J Butterfield - cryptogram solving aid  
JOTTO -- J Butterfield - guess a word  
POEMS -- J Butterfield - write poetry  
MYSTERY -- J Butterfield - you can't list it!  
ADDER -- Earl Wuchter - functions as an adding machine (nicely  
done)  
HIMONDISS -- monitor and disassembler from SPHINX  
RESEQUENCER -- Joe Trimble - rennumbers BASIC programs by 10  
UNLIST -- Larry Tesler - in this issue  
ELIZA -- adapted for PET by Dennis Cumberton - the computer  
psychologist  
HAMMURABI -- social simulation  
SLOT MACHINE -- Michael Richter  
CRAPS -- Michael Richter  
BREAKOUT with Sound  
RESEQUENCER -- Jim Trimble - line renumber routine  
POP SHOT -- from Sphinx Group - shooting gallery with sound  
STARS -- John Broomhall - children's number guessing game  
LINEQN -- Frank Alexander - solves linear equations using matrix  
invert subroutine.  
POUNCE -- John Broomhall - kids game -- if you don't pounce the  
right number of spaces, the mouse might run into his hole.

STAR WARS -- John Broomhall

AUTO-DOODLE -- Frank Levinson - draws very nice rectangular  
patterns.

FOURIER -- Frank Levinson - very nice high density graphing --  
visual demo of Fourier approximation curve fit.

\$2 for the first program including cassette and postage, \$1 for each  
additional -- max 4 per tape. This "programs on tape service" is  
priced to hopefully cover the cost of a part time person to copy and  
mail the tapes. If you have a program to add to the list, please send  
it on tape. We will copy it and return your tape (with program of  
your choice).

## PET Operator Hierarchy

Raynar Taylor Charleston, South Carolina

I have been a witness to a phenomenon of the PET that is as yet  
unmentioned. I am very excited about this phenomenon particularly  
because it is usually found only on the large computers. Sometimes  
when I try to execute a machine language subroutine, the PET gives  
me an "ILLEGAL QUANTITY ERROR". After I recheck the argu-  
ment in SYS(X) or USR(X) and find it to be within the prescribed  
ranges, the PET still refuses to execute the subroutine. At this  
point I figure that something must be wrong with the subroutine, so  
I go back and check it. What do you know, I always find an error.

What this means is that the PET, before giving itself up in a  
possibly detrimental subroutine, looks over and checks for errors.  
Some type of dynamic debugger must be implemented in the PET -  
imagine, a program that checks programs!

Sometimes, however, the dynamic debugger will fail to find  
logical errors such as endless loops, etc. This is because the pro-  
gram looks good, that is, has no illegal opcodes, no bad branches  
etc.

## T I S

### WORKBOOKS FOR THE COMMODORE PET 2001

#### Getting Started with Your PET WB-1 \$4.00

Covers the fundamentals of PET BASIC: calculator  
and program mode, data input and output, data  
representation, program storage on the cassette.

#### PET String and Array Handling WB-2 \$3.95

Covers string and substring search, concatenation,  
replacement and manipulation.

#### PET Graphics WB-3 \$4.95

Covers use of cursor control and special graphics  
symbols to draw plots, histograms, and sketches.

#### PET Cassette I/O WB-4 \$4.95

Covers OPEN, CLOSE, string and numeric data files.

#### Miscellaneous PET Features WB-5 \$3.95

Covers the clock, random number generator, upper  
and lowercase alphabetic characters, saving memory  
space, etc.



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BETSI PET to S-100 Interface Motherboard \$139  
Four slot motherboard - On board sockets  
and decoding circuitry hardware with  
four 100 pin edge connectors. Assembled.

BETSI Kit \$105

Power Supply for BETSI \$34  
8 volt/6 amp. Assembled in case

S-100 8K Static RAM (Problem Solver Systems) \$149  
Assembled, tested, and burned-in at factory.  
120 day warranty PERFECT FOR BETSI.

Protect-A-PET \$9.95  
Custom fitted clear vinyl dust cover with  
quality stitched seams for those rare  
occasions when you're away from your PET

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#### PET PROGRAMS ON CASSETTE

ABTAPEI includes Life, Biorhythm, Othello, \$8  
Mastermind II, Multiprimer (moth tutorial-  
deduction game), and Klingon Capture

KITES -- A new, unique two player game by \$7.95  
Michael Riley. A simulated kite fight with  
background on fighter kites included with  
documentation. The best game for the PET --  
you won't be able to stop playing.

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6500 Programming and Hardware Manuals \$6.50 each  
The 6500 Programming Manual is  
indispensable if you are interested in  
Machine Language programming

Hewlett-Packard IEEE-488 condensed description \$1.50  
of Interface Bus

Stimulating Simulations -- an interesting book \$5  
containing 10 gamelike simulations written in  
BASIC. Excellent documentation and user  
instructions (modifications included).

Basic BASIC - James S Coan \$8.95

Game Playing with BASIC - Donald D Spencer \$6.95

Advanced BASIC - James S Coan \$7.95

How to Profit From Your Personal Computer \$7.95  
TG Lewis

Programming a Microcomputer:6502 \$8.95  
Teaches microcomputer programming in  
machine language. Emphasizes KIM-1.

#### Cassette Tapes

C-10 (5 min/side) -- high quality Agfa tape 10/\$6  
C-30 (15 min/side) 10/\$8.25  
Unbreakable Ampex plastic cassette boxes 10/\$2.50

PET Edge Connector Plugs with Keys \$1.75  
Second Cassette \$2.50  
User or IEEE-488 Port

KIM-1 \$179

Write for list of KIM-1 and PET memory and accessories

PO Box 104  
Perkasie PA 18944  
(215) 257-8195

A B Computers

\*\*\*\*\*  
'RESEQUENCER' BY JOE TRIMBLE  
OAKLAND, CA. 5/29/78  
\*\*\*\*\*

THIS PROGRAM WILL RESEQUENCE LINE NUMBERS (INCLUDING ALL GO  
TO'S, GDSUB'S AND THEN'S) BY 10, STARTING WITH 10, FOR ANY  
SUBSEQUENTIALLY LOADED PROGRAM.

THIS PROGRAM HAS SEVERAL RESTRICTIONS:

1. LINE NUMBER 0 WILL BE RESEQUENCED TO LINE 10, BUT  
REFERENCES TO LINE 0 WILL NOT BE CONVERTED.
2. LINE NUMBERS GREATER THAN 63987 WILL NOT BE RESEQUENCED
3. ONLY 255 LINES CAN BE CORRECTLY RESEQUENCED, DUE TO  
THE CURRENT MATRIX LIMIT.
4. ALL NUMBERS FOLLOWING ANY 'GOTO', 'GOSUB', OR 'THEN'  
ON THE SAME TEXT LINE WILL BE CONVERTED, IF POSSIBLE!  
(EVEN AFTER A '1' OR INSIDE PARENTHESES.)
5. IF THE NEW (RESEQUENCED) NUMBER HAS MORE DIGITS THAN  
THE OLD NUMBER, THE CHARACTER PRECEDING THE OLD NUMBER IN  
TEXT LINES IS REPLACED BY THE FIRST DIGIT OF THE NEW NUMBER  
FOR EXAMPLE, 'GOTO 25' BECOMES 'GOTO150' (IF 150 IS  
THE NEW EQUIVALENT OF OLD LINE 25).  
HOWEVER, IF NO SPACE PRECEDES THE OLD LINE NUMBER,  
THE 'GOTO', 'GOSUB', 'THEN' OR CONNA (IN THE CASE OF  
'ON...THEN ##,##,##') WILL BE REPLACED BY THE FIRST  
DIGIT OF THE NEW NUMBER.  
FOR EXAMPLE, 'GOTO25' BECOMES JUST '150' (IF 150  
IS THE NEW EQUIVALENT OF OLD LINE 25). 'ON...THEN  
25,26,27' BECOMES 'ON...THEN150160170'

TO RUN THIS PROGRAM:

1. LIST LINES 63988-63999
2. REPLACE 'READY' AFTER LISTING WITH 'LOAD'-DON'T 'RETURN'
3. PRESS 'PLAY', THEN PRESS 'RETURN'.
4. AFTER 'READY' APPEARS, GO 'NONE', FOLLOWED BY '11' 'RETURN'S  
TO ENTER LINES 63988-63999 INTO YOUR PROGRAM.
5. TYPE 'GOTO 63988', THEN 'RETURN'.
6. AFTER 'READY' APPEARS SAVE THE RESEQUENCED PROGRAM.  
(YOU MAY DELETE LAST 11 LINES FIRST UNLESS NEEDED AGAIN)

```
63988 DINL(256):L=1025:DEFFNR(X)=PEEK(X)+256*PEEK(X+1):DEFFNM
(X)=INT(10*X/256)
63989 N=FNR(L):X=FNR(L+2):IF X<63988 THEN A=A+1:L(A)=X:L=N:GO
TO 63989
63990 L=1025:FOR B=1 TO A:N=FNR(L):PDKE(L+3),FNN(B):POKE(L+2)
,10*B-256*FNN(B)
63991 F=0:FOR C=L+4:TON-1:P=PEEK(C):IF P=1370R P=1410R P=167TN
EN F=1:GOTO 63999
63993 IF F<0 THEN IF P>47 AND P<59 THEN D=10*0+P-48:G=1:GO
TO 63999
63994 IF F=0 OR D=0 GOTO 63999
63995 FOR E=1 TO A:IF D=L(E)GOTO 63997
63996 NEXT E:D=0:G=0:GOTO 63999
63997 D=0:E$=STR$(E*10)+"" :N=LEN(E$)-4:C=C-G:IF H>G THEN C
=C-1:G=N
63998 FOR I=1 TO G:POKE C,ASC(MID$(E$,I+1,1)):C=C+1:NEXT I:G=0
63999 NEXT C:L=N:PRINT B:NEXT B:END
```

REPEAT Key  
Hans-J. Kach West Germany

The sensing of keys with location 515 is very good (issue 4),  
when you have a program for text editing. One thing that the  
PET lacks is a REPEAT, or automatic, key. With the following  
short program, you can have a repeat function:

```
10 GET A$: IF A$="" GOTO 10
20 P=PEEK(515): D=60
30 PRINT A$;
40 T=TI+D
50 IF PEEK(515)=255 GOTO 10
60 IF I<T GOTO 50
70 D=6: GOTO 30
```

The program echoes the input. If you release the key, the  
program waits for the next input. If you press the key more  
than one second (D=60), you will get the character ten times  
a second (D=6). If you press a second key, then release the  
first key, the program will not work properly, but that can  
be corrected with a few modifications.

# KIM-1 Talks to PET Frank Covitz

Since both the KIM-1 and the PET are 6502 based systems, it ought to be possible to convert many KIM programs to run on the PET. Here are a couple of programs to enable the KIM-1 to transfer data to the PET over the user ports, with KIM providing a "handshake" signal to PET.

Both programs are relocatable, except for the JMP address at the end of each, which sets up things for a repeat. Stopping at the BRK is OK. (The KIM appears to jump over 2 bytes after a BRK, but the PET seems to jump over only one byte). Don't forget to set the BRK address on the KIM, at address 17FE and 17FF, to 00,1C.

I have a copy of a PET machine language monitor, which makes it fairly easy to program the PET. By the time this article is printed, the PET monitor should be available (according to Commodore). Without the monitor the PET data has to be POKE'd in decimal.

Both programs should be fairly clear to KIM programmers. The KIM fetches data bytes from CURL, H and puts them out to the port A lines. A handshake signal (high to low to high) is then sent over KIM port B-0 to the PET CA1 line. This signals that a new byte is available. The JSR SCAND at 17AE was put in to let the KIM LED display show the data flow, and limits the transfer speed to about 1 page (256 bytes) per second, fast enough for me. By eliminating the JSR SCAND (with NOP's), and setting the delay time byte at 17AA to 01, I have been able to get reliable data transfer speeds of about 30,000 bytes per second!! (The SEI and CLI instructions in the PET programs are required to get that speed).

The PET program is fairly straightforward. On turn-on the CA1 port is set to recognize a high-low-high transition (this clears bit 1 of the IFR control register at E84D<sub>hex</sub>, which resets itself when the user port is read -- called SYNC in the PET application notes and is at address E841). Note - the zero page addresses 00 through 05 are used in the PET program and may not be "safe" an return to BASIC. Therefore, without the monitor, it may be necessary to restore them before the BRK. On my machine these six bytes are 76,48,209,0,0,0 (decimal) or 4C,30,D1,00,00,00 (hex).

As mentioned above, connect the KIM port A0-7 lines to the corresponding PET user port lines (PA0-7, pins C-1 on the user port connector), and the KIM port B0 line to the PET CA1 line (pin B on the user port). Set the start address (low,high), and the end address + 1 (low,high) of the KIM data to be dumped into address

0000-0003, respectively. Do the same for the PET addresses 0000-0003 (a where the data will be dumped). The PET addresses do not have to correspond (except in that the number of bytes to be dumped should be equal or less than the KIM data to be transferred).

Start the KIM program first (at address 1780<sub>hex</sub>) then start the PET program at 0800<sub>hex</sub> (or 2048<sub>dec</sub>). Nothing happens until the "+" key on the KIM is pressed. If you have left in the JSR SCAND instruction on the KIM, you will see the addresses and data being transferred on the KIM LED display.

One further note on transcribing KIM programs to run on the PET. Be careful to convert all port addresses and data direction registers, all references to absolute addresses. References to KIM ROM routines will, of course, need to be re-written.

KIM-1 Program (page of KIM talks to PET)

RI	Address	Op.	code	Byte 1,2	Addr.	Op.	BI	B2	Comments
	START	LDA	#	FF	1780	A5	FF		Set up Pass A0-7 on
		STA	DAD0		1782	8D	01	17	enable
		LDA	#	01	1785	A9	01		Set up Port B0 as
		STA	PBDD		1787	8D	01	17	output and set the
		STA	PB0		178A	8D	02	17	bit to 1
	BACK	JSR	CETKEY		178D	20	6A	FF	Wait for the "+" key
		CHKD	#	*	1790	C2	12		
		BNE	BACK		1792	D0	PS		
		LDA	STARTL		1794	A5	00		Set up source address
		STAA	POINTL		1796	85	FA		
		LDA	STARTH		1798	A5	01		
		STAA	POINTH		179A	85	FB		
	AGAIN	LDA	#	00	179C	A0	00		Store high address
		LDA	POINTL		179E	B1	FA		Fetch data
		STAA	DAD		17A0	8D	00	17	Put it on Pass A
		DEC	DBD		17A3	C8	02	17	Put out a low-to-high
		INC	PB0		17A6	8E	02	17	transition on Data B0
		LDA	#	Delay	17A9	A9	10		Slow down
		STA	TIMER		17AB	5D	04	17	
	SYNCL	JSR	SCAND		17AE	20	15	1F	Show it on display
		FTT	TIMER	*	17B1	2C	07	17	Time up?
		POL	DIBDL		17B4	10	F5		
		INCA	POINTL		17B5	E6	FA		Now get address of next
		STAA	CURL		17B8	8D	02		byte
		INCA	POINTH		17BA	E6	FB		
	COF	LDA	POINTL		17BC	A5	FA		Check for end
		CHDA	#	ENDL	17BE	C5	D2		
		BNE	AGAIN		17C0	D0	DA		
		LDA	POINTH		17C2	A5	FB		
		CHDA	#	ENDH	17C4	C5	D3		
		BNE	AGAIN		17C6	D0	DB		
		BRK	#		17C8	00	00		Done
		JMP	START		17CA	4C	80	17	Back to beginning

## REL-ONIC ADDRESS

STARTL 0000  
STARTH 0001  
ENDL 0002  
ENDH 0003  
POINTL 0004  
POINTH 0005  
PAB 1700  
PADD 1701  
PBD 1702  
PBDD 1703  
TIMER 1704  
TIDR 1707 (the time-out addr.)  
START 1780  
BACK 178D  
AGAIN 179C  
SYNCL 17AE  
COF 17BC  
SCAND 17B1  
GETKEY 17C8

This program is relocatable. eeeep!  
See the JMD "START" at 17CA  
See high speed replace JSR SCAND (PO 191F)  
see 17AB with NOP NOP NOP (EA EA SA).

P.E.T. Program (part of KIM talks to PET)

PET Address	Op.	code	Byte 1,2	Addr.	Op.	BI	B2	Comments
0800	SWI			0800	78			Disable interrupts
	LDA	#	1FE	0801	AD	4D	E5	Set up IFR to recognize
	ORAI	#	02	0804	09	02		a high-to-low transition
	STA	#	1FE	0806	8D	4D	E8	
	LDA	STARTL		0809	A5	00		Set up source address
	STAA	CURL		080B	85	04		
	LDA	STARTH		080D	A5	01		
	STAA	CURL		080F	85	05		
	LDA	#	00	0811	A0	00		Store high address
	LDA	POINTL		0813	A5	02		Check CA1 for strobe
	BIT	#	1FE	0815	2C	4D	E7	
	BEQ	BAC		0818	90	7E		
	LDA	SYNCL		081A	AD	41	E5	Fetch data from user port
	STAA	CURL		081C	91	04		Store it
	INCA	CURL		081D	E6	05		Now get next address
	BNE	COF		0821	D0	02		
	INCA	CURL		0823	E6	05		
	C.F	ENDL		0827	C5	D2		Check for end
	BNE	AGAIN		0829	D0	E3		
	LDA	CURL		082B	A5	05		
	C.F	ENDH		082D	C5	D3		
	BNE	AGAIN		082F	D0	E2		
	CLI			0831	58			Clear interrupts disable
	BRK	#		0832	00			Stop
	JMP	BACK		0834	4C	00	08	Set up for repeat

## REL-ONIC ADDRESS

STARTL 0000  
STARTH 0001  
ENDL 0002  
ENDH 0003  
CURL 0004  
CURL 0005  
SERIE 0800  
AGAIN 081A  
BACK 0832  
COF 0827  
SYNCL 081A

The program is relocatable. eeeep!  
for the JMD "START" at 0833

uses port with handshake  
pre-set as all input on turn-on  
of PET?  
IFR E84D (Control register for user port)

## PET SCHEMATICS

Another First From "PET-SHACK".

For only \$34.95 you get:

24" x 30" schematic of the CPU board, plus oversized schematics of the Video Monitor and Tape Recorder, plus complete Parts layout—all accurately and painstakingly drawn to the minutest detail.

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Mishawaka, IN 46544

Some people seem to be bothered that if you perform POKE 59468, 14 to permit lower case characters, the keyboard is reversed - that is, you have to use SHIFT for lower case letters. It's easy enough to fix, if desired, as the simple demonstration program shows:

```
300 POKE 59468,14 : C=32 (space character)
310 C=198-C : T=T+15 : ? CHR$(C) ; "cl" ; ("cursor left")
320 GET Z$ : IF Z$ <> "" GOTO 350
330 IF T < T GOTO 320
340 GOTO 310
350 Z=ASC(Z$) : IF Z > 64 AND Z < 91 THEN Z$=CHR$(Z+128)
360 IF Z > 192 AND Z < 219 THEN Z$=CHR$(Z-128)
370 ? "sp cl";Z$ : GOTO 320 ("space cursor left")
```

Special PET Print Control  
Jim Butterfield Toronto

By now, most readers of the instruction book - and PET User Notes know about the cursor movements, plus Home and Screen Clear. A couple if others should be mentioned:

- Delete (reverse T) can be useful because it moves everything to the right of the cursor (on the same line) to the left. Great for generating left-movement effects. Remember that Delete doesn't work if the cursor is in column 1.
- Insert (reverse shift T) gives the opposite effect to Delete: it will move a whole line right. Remember that you must follow the Insert symbol with the information to be inserted (say, a space); and characters pushed beyond the right margin may reappear on the next line.
- Carriage Return (reverse shift M) starts a new line.
- Reverse (reverse R) and reverse-off (reverse shift R) turn the reverse feature on and off during printing.

SWITCHER  
Frank Covitz Lebanon, NJ

Since most 6502 programs make extensive use of zero-page, here is my SWITCHER routine:

This is locatable anywhere. To use, stick a JSR SWITCHER at beginning of your 6502 program then do another JSR SWITCHER before the final BRK, RTS, or JMP BASIC.

```
SEI 78 protect from interrupts
LDX #BYTES A2 NN NN=no. of bytes to be preserved
LDAX BASE-1 B5 MM MM=start address-1 of zero-page
PNA 4B save it on stack
LDAX BASE-1 PAGEN B0 NN PP fetch data from page PP
STAX BASE-1 95 MM store it in page zero
PLA 68 fetch previous page zero data
STAX BASE-1 PAGEN 90 MM PP store it in a safe place-SWITCH
DEX CA do it NN times
BNE F1 D0 F1
CLI 58 clear the interrupt disable bit
RTS 60 then return
```

This is locatable anywhere. To use, stick a JSR SWITCHER at beginning of your 6502 program then do another JSR SWITCHER before the final BRK, RTS, or JMP BASIC.

\*\*\*\*\*

```
40 REN WOLF
50 REN NEIL HARRIS
70 REN CB2 ON USER PORT TO AMPLIFIER
100 POKE59467,16:POKE59466,15
110 FORL=180T076STEP-3:POKE59464,L:NEXT
120 FORL=200T0100STEP-3:POKE59464,L:NEXT
130 FORL=100T0250STEP3:POKE59464,L:NEXT
999 POKE59467,0
```

## BUSINESS SOFTWARE FOR YOUR 8K PET

**PAYROLL** - Computes Federal, F.I.C.A. and State (instructions for your State's data) taxes. Accumulates totals for quarterly and yearly reports. Keeps data on employees such as name, address, social security number, marital status, employee number, etc. Records data on convenient cassette tapes. Up to 25 employees recorded on tape or can compute tax information for any number of employees.  
..... \$30.00

**CHECKBOOK RECONCILIATION** - A program for anyone, includes extensive human engineering and instructions for ease of use. Balances checkbook and bank statement from month to month. Records data on cassette for next month's balancing - saving re-entry of figures.  
..... \$25.00

**ACCOUNTING PACK I** - Includes General Ledger, Check Journal, Income Statement, Balance Sheet and more. For Home or Small Business use. Up to 40 accounts - Up to 50 different entries per month.  
..... \$25.00

**SCHEDULE PLANNER** - Perfect for the busy business man. Input date, descriptions, priority and deadline date, program sorts and lists most important jobs to be done. With Clock subroutine alerts operator to appointments. Also records data.  
..... \$15.00

**SCHEDULE PLANNER #2** - Same as above, but for the secretary who must keep appointments of several persons. Will also list daily appointments and priorities.  
..... \$20.00

**CALCULATOR** - For accountant-bookkeeper. Not only allows your PET to function as a calculator, but also includes lister (verifies and displays errors between two tape listings) and Matrix (which adds columns vertically and horizontally).  
..... \$10.00

**FINANCIAL PACK I** - Includes Amortization Schedule, Calendar (figures days between two dates), Rebate, Compound, Annuities and Monthly Payment.  
..... \$15.00

**BUSINESS GRAPHIC PACK I** - Not a simple graphic program, but a professional business program that labels axes, uses curve fitting regression (Nth order or geometric) for projection of trends and continuity, optional X axis = Time for date entry, dual graphic ability, and more.  
..... \$25.00

**BUSINESS ANALYSIS** - Developed by a Bank Cashier, this program allows detailed analysis for management in the areas of liquidity, profitability, leverage and activity (ratio and trend) for financial planning decisions.  
..... \$30.00

**CHESSBOARD** - Two players can play chess on your own PET graphic chessboard - displays each player's time and records moves for future playback.  
..... \$15.00

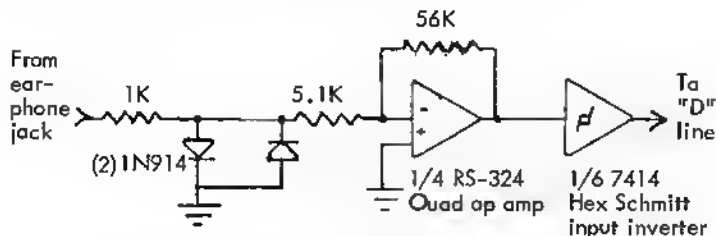
All Programs in BASIC and on Cassette.

SAWYER SOFTWARE  
828 Lewis, Rt.#3  
Dexter, MO 63841  
314-624-7611

Sawyer Software is quickly becoming recognized as a leader in quality business and personal software for the PET user. If you are the software author of a quality business or personal program (not games, please), contact us about our royalty program.

Stephen Hui, using a Sony recorder, needed an extra inverter on the input circuit (which he obtained by tying in another gate on the same 74132 package).

Frank Covitz sent the following:



Apparently Frank's Sear's cassette recorder has either low output and/or high distortion.

The diodes and  $\sim 10X$  DC amplifier work over a wide range of input voltages. Both IC's are driven from the PET 5V "B" line. I have had very good reliability on both read and write, and tape interchangeability using this cheap recorder, which, by the way, has a tape counter. The tape itself seems to be the most critical element. I have had very reliable results using Radio Shack Super-tape and Ampex Plus Series cassette tape.

Russell Martin suggested that the problem is probably with the recorder, and that any player used should be capable of producing TTL switching level voltages at the inputs of the Schmidt trigger NAND gate. His Bigstar KD-3000 has an output of 4.8VAC RMS and works well, but his Craig 2603 produces 3.8VAC RMS, and isn't recognized by the interface (due to additional voltage drop caused by the 1N914 diode and the half wave rectifier circuit in which it was used). Possible solutions: replace 1N914 (or 1N4148) with a germanium diode; use full wave rectifier bridge to replace single diode; use IC audio amplifier before the diode to boost signal. Further, Russell mentioned that some recorders don't like the AUX input connected during playback.

## ANNOUNCING

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# PET

personal computer



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## CONNECTICUT microCOMPUTER

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## HS-232 PRINTER ADAPTER FOR THE COMMODORE PET

The CONNECTICUT microCOMPUTER ADAPTER model 1200 is the first in a line of peripheral adapters for the COMMODORE PET. The Cmc ADA 1200 drives an RS-232 printer from the PET IEEE-488 bus. The Cmc ADA 1200 allows the PET owner to obtain hard copy program listings, and to type letters, manuscripts, mailing labels, tables of data, pictures, invoices, graphs, checks, needlepoint patterns, etc., using a standard RS-232 printer.

The Cmc ADA model 1200B comes assembled and tested, without power supplies, in a standard rack-mountable case, or RS-232 connector for \$98.50. The Cmc ADA 1200C comes complete for \$169.00. Specify baud rate when ordering. (300 baud is supplied unless otherwise requested. Instructions for changing the baud rate are included.)

## NORD PROCESSOR FOR THE COMMODORE PET

CONNECTICUT microCOMPUTER now has a word processor program for the COMMODORE PET. This program permits composing and printing letters, flyers, advertisements, manuscripts, articles, etc., using the COMMODORE PET and an RS-232 printer.

Script directives include line length, left margin, centering, and skip. Edit commands allow the user to insert lines, delete lines, move lines, change strings, save onto cassette, load from cassette, move up, move down, print and type.

The CmC Word Processor Program addresses an RS-232 printer through a CmC printer adapter.

The CmC Word Processor Program is available for \$29.50.

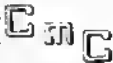
## RS-232 TO CURRENT LOOP/TTL ADAPTER

The Cmc ADAPTER model 400 has two circuits. The first converts an RS-232 signal to a 20 ma current loop signal, and the second converts a 20 ma current loop signal to an RS-232 signal. With this device a computer's teletype port can be used to drive an RS-232 terminal, or vice versa, without modification of the port. The Cmc ADA 400 can also be paralleled to drive a teletype or RS-232 printer while still using the computer's regular terminal. The Cmc ADA 400 can easily be modified to become an RS-232 to TTL and TTL to RS-232 ADAPTER. The Cmc ADA 400 does not alter the baud rate and uses standard power supplies. The current loop is isolated from the RS-232 signal by optoisolators.

The CmC ADA 400 is the perfect partner for KIM if you want to use an RS-232 terminal instead of a current loop teletype.

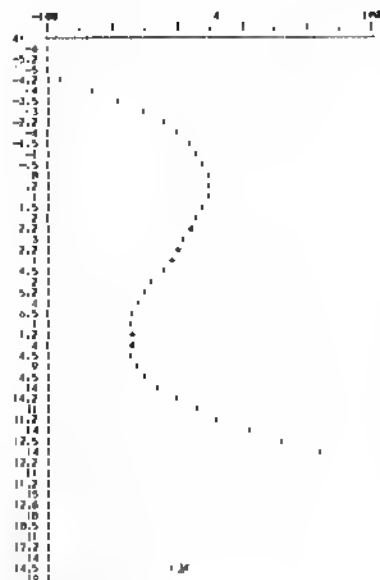
The CmC ADA 400S comes with drilled, plated through solder pads and sells for \$24.50. The CmC ADA 400B comes with barrier strips and screw terminals and sells for \$29.50.

This announcement was composed on a COMMODORE PET and printed on a GE TermiNet using a Cmc ADA 1200C printer adapter and the Cmc Word Processor Program.

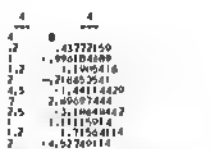
Only	Description	band	rate	price	total	Call with credit line or charge information to	
	1 CMC ADA 1200C (base)el	1		198.50	1	 <b>CONNECTICUT microCOMPUTER</b> 150 Pocono Road, Room 6 Brookfield, Conn. 06804	
	1 CMC ADA 1200C (complete)el	1		1169.90	1		
	1 CMC Word Processor Program (complete)el	1		129.50	1		
	1 CMC ADA 800S (order model)	1		129.50	1		NAME
	1 CMC ADA 400S (order model)	1		129.50	1		COMPANY
	Subtotal				1	ADDRESS	
	Connecticut residents add 7% sales tax				1		
	Handling and shipping - add per order			93.90	1	CITY	
	Foreign air mail - add 15.00 per order				1	STATE	
	Total included with order				1	ZIP	
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Credit card number							
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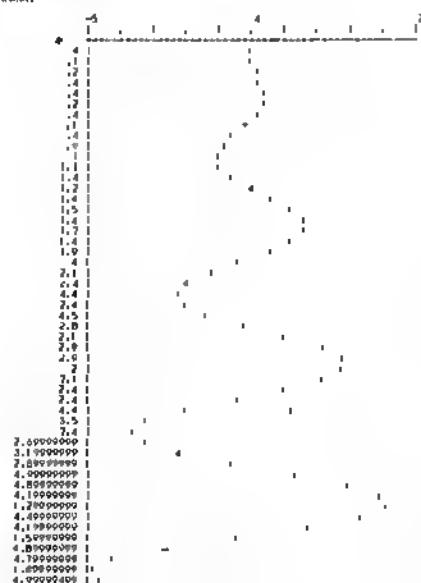
COMMOORE PET HARD COPY OUTPUT USING PET AOA 1200



1000 AFM THE FUNCTION PLITTED IN  
1414 1:4 K:4/1-2:4:4:4:4:4:4  
READY.



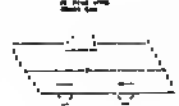
FROM REM THE FUNCTION PLOTTED IS  
1414 Y: 7:11414,4:71  
READY.



```

5.00000000 1
NAME THE FUNCTION LISTED IS
414 4:4:51414.041
601

```



```

0774 D,B:CAD DLIST
08 W74 L7C5IR 450 4AC0C2 7UWCT1PW2 7107 TH7 C2V4NH0H4E PE2
2R W74 WRIT72R BY 41CHARD W1544R
2R W74 C2V4 C2V4C7C1C74 41CMCC0WPU7R
40 R74 12R PUCHING R10
40 R74 0H7WFFIELD, CT 060R4
40 R74
1R 944 *Lia7id on a C7 T1m1Rat 700
40 W74 *ealing a Cmc 404 12Pw,
9R 474
1R0 R74 0PEX 4U7PU7 717R 0R 0EV7C2 48,
110R 107R 2,6
12R RER
5W1 RER GET 4 S1R7 VALRE
51R INPUS 5
52R C27
23R 474
10R 474 7ME 11H7 07 THE 4NCL7 12 5
101R W74 E7 THE S1M 72 7M TH7 0ANCE 1H -1 TO 1, TH7R C2V4W7E7.
102R 72 2<1 4ND S=1 C0R7 115R
103R 45-0R1C07S0W9
104R 72 TH7 4NCL7E E7 45
104R 45-47412/111=9*21", 211
106R 5ER THE 0ESULT 72 7M 4N04C7R, C2V4W74 70 0E47C7S,
1R70 42=421 1047
21MR 47R THE C0S7E OF THE 4NGL7 75 C
21R 454 17 THE C0S7E 17 THE 4NCL7 -7 TH 1,
211R 45R 440 007 - 7U 0, TH7W C0MPUT7
202R E7 C1R TH7R 5470
202R 4C=091C077 2000
214R 72 C17 4ND C=1 TH74 2010
215R 4C=07077R 5000
216R 0E4 TH7 4NCL7S E7 4C
217R 4C1 TH7111=C1C1-2,7C1
218R 07R TH7 0ESULT 15 74 01 01445, C2V4W747 T0 0E4W7E2,
219R 4C1 4C1 10R7
219R 0914712, 57R, C02 4BC27R 4RCC174
301R 7414745, 51
512R 714 W1 7U 12=LEH1STW1571P0H1745, ' - 11R47
212R 091R742, 151
514R 704 R1 7U 12=711ST01145710911715, ' - 11R47
215R 091R742, 1C
515R 0770 5000
4247C2

```

[illegible][illegible][illegible]

C m D

## CONNECTICUT microCOMPUTER

750 POCONO RD. - BROOKFIELD, CT 06804 • (203) 775-9659

1. Logic for wait states and protect are not used.
2. Page select switches are not necessary.
3. Change MWRT driver on memory board so there are an even number of inversions or no inversions on the PET R/W line.
4. Use A0→A11 and:  
SEL1 and SEL2 for expansion of 4K PET.  
SEL2 and SEL3 for expansion of 8K PET.  
SEL(n) and SEL (n+1) for further expansion.
5. Parallel the memory board data input and output bus and connect to the PET BD0→BD7.
6. Bring R/W and the two PET select lines into the tri-state data bus driver logic so that the driver is only on when memory is selected and R/W is high.
7. Bring A10, A11 and the two select lines into the page select logic.
8. PET A0→A9 connect to the memory board A0→A9.
9. Pet memory expansion connector  
A27 RES  
A28 IRQ  
A29 B02 are not used for memory expansion
10. Get power from external power source and don't forget the ground connection to the PET (upper memory expansion connector pins).
11. Try pull-ups (560Ω) on the PET address, select, and R/W lines if you have problems.

The automatic printing done by PET BASIC when the operator goafs up the input such as "REDO FROM START", "EXTRA IGNORED" and "???" can really screw up a formatted screen layout.

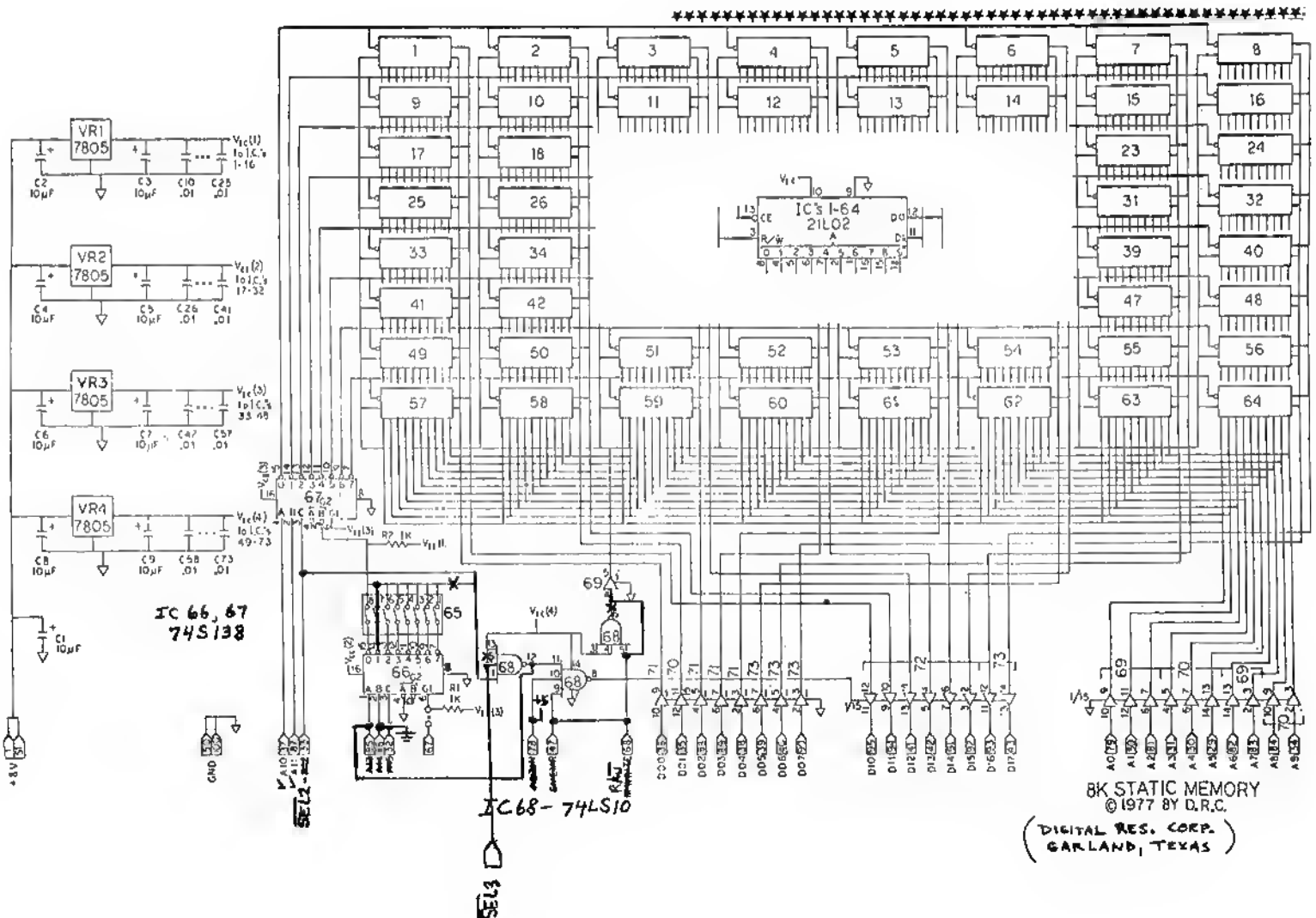
The most common error in inputting alpha data when numeric is expected. This will get you a 15 yard penalty and "REDO FROM START" every time.

One way to avoid this problem is to always input data from the keyboard in STR\$ format, check it's validity in a subroutine, and then if everything is OK, convert the input to numeric with a VAL statement. The following subroutine can be used to perform this function.

```
10 INPUT A$: GOSUB 100 IF F1=1 GOTO 10
20 .....
100 F1=0: ND=0
110 FOR I=1 TO LEN(A$)
120 A1$=MID$(A$,I,1)
130 IF A1$<"0" OR A1$>"9" THEN GOTO 150
140 NEXT I: A=VAL(A$): RETURN
150 IF A1$="-" AND I=1 GOTO 140
160 IF A1$="." AND ND=0 THEN ND=1: GOTO 140
170 F1=1: PRINT "cu";
180 PRINT A$: " IS NOT NUMERIC." : PRINT "cu";
190 RETURN
```

This subroutine checks each character in the string to see if it is a value between 0 and 9. If each individual character is a number then the string is numeric.

Line 150 allows a leading "-" to be accepted indicating a negative value. If all is OK, line 140 sets A to the numeric value of A\$ and RETURNS. If a non-numeric character is encountered, an error message is printed and control is returned to the INPUT command.



This circuit provides composite video output from the PET. I have used the output to drive two different monitors with good success. The circuit is very simple and can be put together with a wire wrap tool in a few minutes.

I used one of the existing PET 5 volt sources. The easiest way to steal the video and drives is to carefully scrape clean the fo

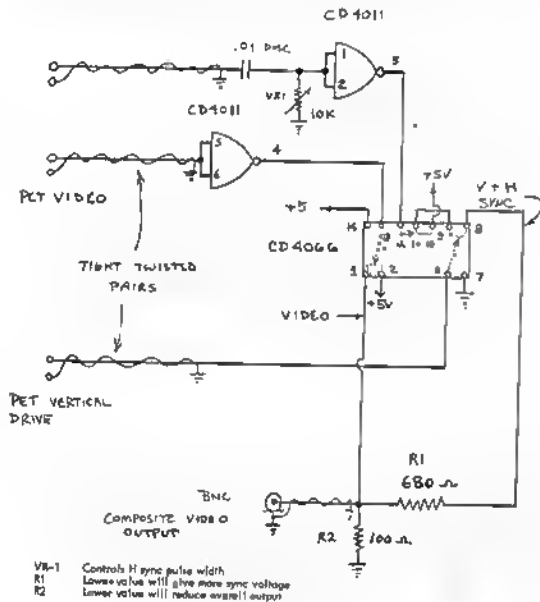
#### PET Composite Video Interface Cal Merritt Danville, Indiana

This circuit provides composite video output from the PET. I have used the output to drive two different video monitors with good success. The circuit is very simple and can be put together with a wire wrap tool in a few minutes.

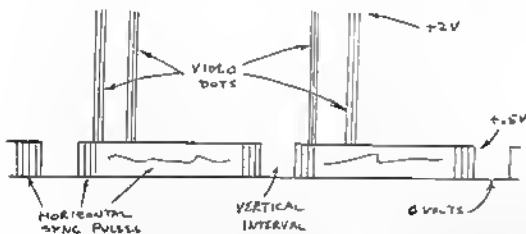
I used one of the existing PET 5 volt sources. The easiest way to steal the video and drives is to carefully scrape clean the foils next to where the monitor plug is and tack solder a twisted pair to each signal and the closest ground buss. Other variations would work equally well.

To avoid metal shavings and such falling on the main board, I removed the back cover from the monitor (Power OFF) and mounted a BNC jack two inches to the right of the brightness control and fed it with a twisted pair. I mounted the board under one of the bolts that hold the monitor to the main chassis and attached the drive twisted pairs to the existing ones for the monitor.

Video monitors seem very tolerant and the two units I have used work fine. The only problem encountered was in attempting to do all white screen or very dense graphics which caused sync tear in one of the monitors. Normal or dense listings worked well.



OUT PUT WAVEFORM



All three monitors I tried worked with this video output. The appearance of the video will be a function of the quality of the monitor. Some of the scrapped out commercial units available with the 10 MHz and more bandwidths look excellent with the PET video. I have had a number of people comment that my 12" commercial monitor looks better than the built in unit. The add-on does not alter the existing PET display in any way.

## P.E.T.™ PRODUCTS

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```

0 GOTO 60000: REM UMLIST (LARRY IESLER)
60000 OPEN 1,1: REM ***FILE SPEC***
60010 GET#1,C%:IFASC(C%)<>13GOTO60010
60020 POKE10,1:Y%="3":PRINTY%:D=-6:E=252:S=6:C=13:GET#1,C%:I
FC%="R"BOT060050
60030 PRINTC%:IFASC(C%)<>CTHENGET#1,C%:S=D*(EANDST)=0):TFS6
OT060030
60040 Z=2:Z%="60T060020":IFS6OT060070
60050 CLOSE1:PRINT#10("ERRORCOM",S+1,6):STOP:PRINTY%:Z=9:Y
=60000:T=10
60060 FORI=0T07:PRINTY+T+I:NEXT:PRINT0
60070 L=525:FORI=1T0Z+1:POKEI+I,C:NEXT:POKEI,Z:PRINTZ%:PRINT"
";:END
61000 REM TO CONVERT AN ASCII PROGRAM
61010 REM (SUCH AS PRODUCED BY
61020 REM OPEN 1,1,1: CM01: LIST
61030 REM FORI=1T0200:PRINT#1," ";:NEXT
61040 REM PRINT#1,"": CLOSE1)
61050 REM TO BASIC, LOAD THIS PROGRAM
61060 REM FIRST, THEN RUN, IT WILL
61070 REM READ THE FIRST FILE ON
61080 REM TAPE 1 AND ASSIMILATE EACH
61090 REM LINE INTO THE PROGRAM.
61100 REM FOR OTHER INPUT SOURCES,
61110 REM CHANGE LINE 60000.
61120 REM TO ADD A SUBROUTINE TO
61130 REM A PROGRAM, FIRST LOAD
61140 REM THIS UMLIST PROGRAM,
61150 REM THEN LIST-61090,
61160 REM THEN LOAD THE PROGRAM,
61170 REM THEN HOME AND HIT RETURN
61180 REM 9 TIMES TO PUT UMLIST
61190 REM INTO THAT PROGRAM.
61200 REM NEXT, PUT IN THE TAPE
61210 REM THAT HAS AN ASCII VERSION
61220 REM OF THE SUBROUTINE (MADE
61230 REM BY LIST), AND RUN.
61240 REM IF IT STOPS BY "BREAK",
61250 REM YOU CAN DELETE THE UMLIST
61260 REM CODE BY SAYING "CONT"
READY.

```

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FIND for PET  
Jim Butterfield Toronto

Need to search for an expression, a variable, or a keyword? Slip program FIND in behind your program (it's not very long) - then insert a line 1 to say what to search for .. and the job's done. Every line in memory which contains the same expression as line 1 will be reported. This includes line 1 itself, of course, and any lines in program FIND .. as well as the program you're searching. I'm spacing out the program listing for readability -- close in the spaces when you input to save space.

```
9000 A=1025 : X=PEEK(1029) : FOR J=1 TO 1E3 : FOR K=A+4
      TO A+83
9001 P=PEEK(K) : IF P=X THEN GOSUB 9005
9002 IF P<>0 THEN NEXT K
9003 A=256*PEEK(A+1)+PEEK(A) : IF A>0 THEN NEXT J
9004 STOP
9005 FOR L=1 TO 80 : Y=PEEK(1029+L) : IF Y=0 THEN
      ? 256*PEEK(A+3)+PEEK(A+2) : RETURN
9006 IF Y=PEEK(K+L) THEN NEXT L
9007 RETURN
```

Example: to find all FOR statements in a program; insert FIND (above) and then insert line 1:

1 FOR

Now invoke FIND with RUN 9000. The program will print 1 followed by any program lines containing FOR followed by 9000 9005. (9000 prints twice because it contains two FOR's).

FOR is a keyword, and doesn't store as three separate characters, so you wouldn't find it if you searched for characters FO. This can be handy: if you were looking for variable F you wouldn't get all the FOR's printed.

Modifications: if you squeezed P=0 just ahead of RETURN on line 9005 (it's a tight squeeze) a line number would print only once even when it had multiple matches; you might or might not want this feature.

Coding note: This is a type of structured program. Note that no loop can repeat without a limit. The complete absence of GOTO's is also considered characteristic of structured coding. A missing neatness element is that of line indentation; PET Basic just doesn't allow it.

IMPORTANT: Don't forget to wipe out line 1 and program FIND when you're finished with them.

```
*****
1 REM TO ROUND A NUMBER N TO D DECIMAL PLACES, USE THE
2 REM STATEMENT IN LINE 30 BELOW:
3 REM
10 INPUT "D";D
20 INPUT "N";N
30 N=INT(N*10^D+0.5)/10^D
40 PRINT N
50 GOTO 20
60 REM
70 REM IF THE NUMBER OF PLACES DOES NOT CHANGE, REPLACE
80 REM 10^D WITH ITS VALUE.
```

Description of USR Function  
Raynor Taylor Charleston, South Carolina

Probably the least documented and least understood element of the PET's BASIC is the USR function.

The USR function is concerned with the direct access to the processor and memory. The only other functions so concerned are PEEK, POKE, and SYS, which read memory, write memory, and call subroutines, respectively. In essence, USR is a combination of these three functions -- in fact, there is nothing USR can do that cannot be simulated through the use of these three.

Syntactically, USR is a pre-defined function, like SQR (square root) and INT (integer value of a number). For this reason, USR has numeric value and is used in calculations, assignment and print statements, etc. The only difference between USR and the others is that the value USR(X) takes on is not necessarily a function of the argument X.

When USR is executed in a BASIC program, two things happen. First, the argument contained within the parenthesis is evaluated and stored in the PET's primary software-simulated accumulator \$B1-\$B5 under the standard five-byte binary representation. Second, the BASIC interpreter takes a jump to subroutine (JSR) to the location specified by the USR vector, memory locations \$01 (low) and \$02 (high) -- actually, an unconditional absolute jump instruction \$4C is stored in \$00, by the initialization routines upon reset, and the subroutine call is taken there.

After this is done, the machine language subroutine takes complete control of the PET. Although there are interrupts occurring all the time from various sources, the PET is at the disposal and mercy of the subroutine -- if something were to go wrong, the only way to bring the PET back to life would be to turn it off then back on, wiping out all programs in the process (the addition of the reset switch would be wise if you are planning on doing some machine language programming since turning the PET on and off is quite a strain on the CRT).

When the subroutine returns to BASIC (\$CED2 for USR and \$C6EE for SYS, incidentally) via the execution of a return from subroutine instruction (RTS) at the original stack level, interpretation of the BASIC program is continued as if nothing happened at all. The value that USR(X) assumes is the value of what is left in the five-byte primary accumulator -- if the subroutine changes nothing in this accumulator, then the value returned is what was put in the accumulator originally, namely the argument X.

```
*****
1 REM TO LINE UP A COLUMN OF NUMBERS FOR OUTPUT, THE
2 REM STATEMENT IN LINE 140 BELOW MAY BE USED.
3 REM
110 N=20: REM -- MAX LENGTH
120 T=LOG(10)
130 INPUT "N";N
140 PRINT SPC(K-INT(LOG(ABS(N))/T));N
150 GOTO 130
```

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